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PENSOFT

The first country record of the Mexican Blind Snake, *Anomalepis mexicanus* Jan, 1860 (Serpentes, Anomalepididae), in Colombia

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Abstract

We report the first Colombian record of the Blind Snake *Anomalepis mexicanus* Jan, 1860, based on a single specimen from Cantagallo municipality, department of Bolívar. Our new record fills a large gap and extends this species' geographical distribution by approximately 630 km in a straight line east-southeast from its nearest previously known Panamanian locality, and approximately 1295 km in a straight-line north-northeast from its nearest previously known Peruvian locality.

Key words

Cantagallo; department of Bolívar; distribution; dry forest; range extension; Serranía de San Lucas; South America.

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Introduction

Belonging to the so-called blind snakes (Scolecophidia), the Neotropical snake family Anomalepididae is composed of 3 genera with 18 species, of which 8 are found in Colombia (Uetz et al. 2018). The anomalepidid genus *Anomalepis* Jan, 1860, is currently contains 4 species: *Anomalepis aspinosus* Taylor, 1939, *A. colombia* Marx, 1953, *A. flavapices* Peters, 1957, and *A. mexicanus* Jan, 1860. All these species are fossorial, adapted for burrowing, and most have been recorded below 600 m above sea level in moist and dry forest of lowlands and foothills. Only *A. colombia* has been recorded between 1000 and 1700 m above sea level (Marx 1953, Arroyo-Sánchez et al. 2016). In Colombia, until now, only 1 species has been reported: *A. colombia*, which is currently believed to be endemic to the country (Peters 1957, Peters and Orejas-Miranda 1970, Kofron 1988, Pérez-Santos and Moreno 1988, Arroyo-Sánchez et al. 2016, Uetz et al. 2018).

Three or fewer specimens each of *A. aspinosus*, *A. colombia,* and *A. flavapices* are currently known in collections (Dunn 1941, Peters 1957, Kofron 1988, Arroyo-Sánchez et al. 2016, Cisneros-Heredia 2016, GBIF 2018). In contrast, 23 specimens of *A. mexicanus* specimens have been reported in biological collections (Appendix 1) to date, collected at about 10 different loca-

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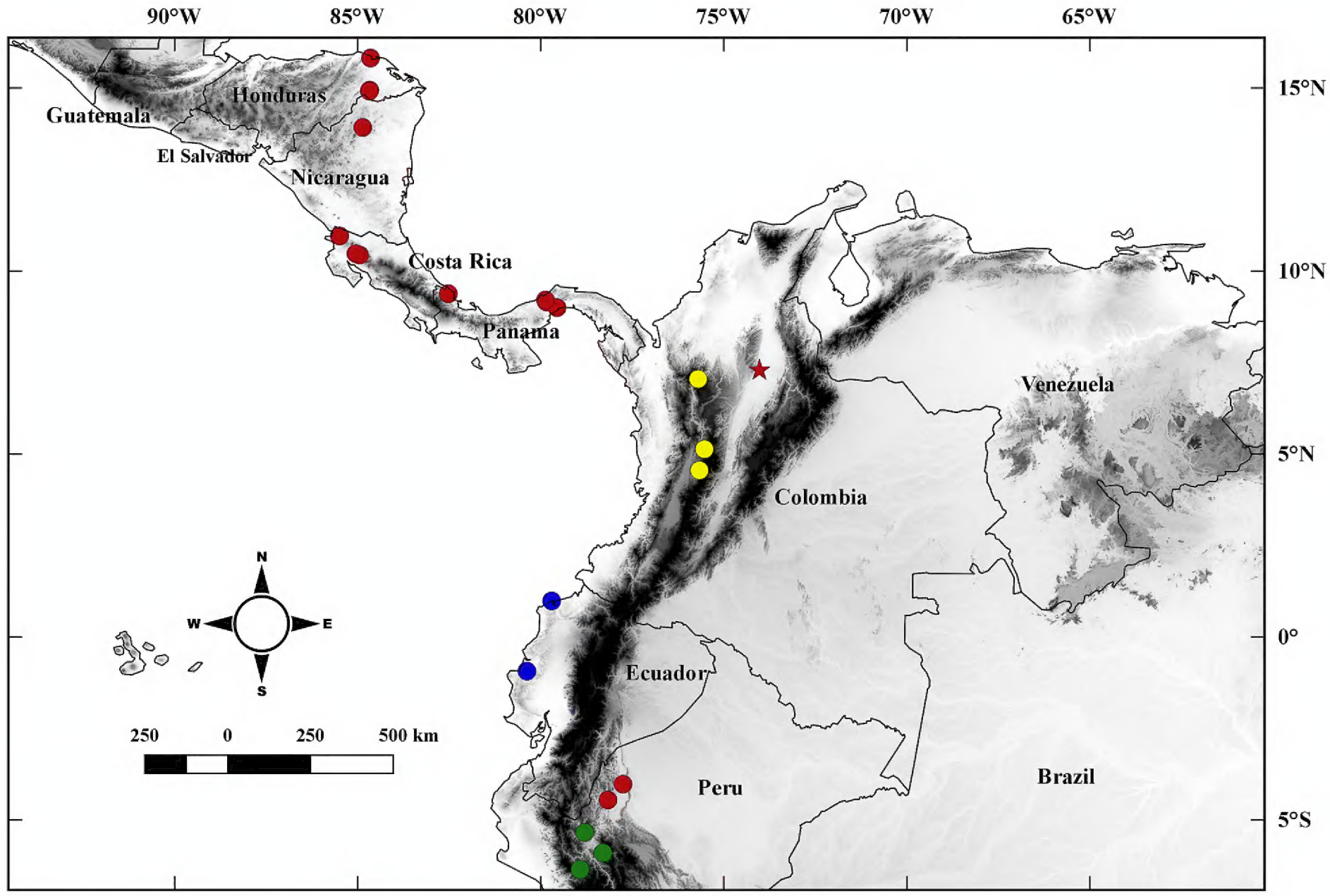

Figure 1. Distribution map for the species of the genus *Anomalepis*. Green circles: *A. aspinosus* (Taylor 1939, Dunn 1941, Kofron 1988). Yellow circles: *A. colombia* (Marx 1953, Arroyo-Sánchez et al. 2016). Blue circles: *A. flavapices* (Peters 1957, Kofron 1988). Red circles: *A. mexicanus* in Central America and Peru (Dunn 1941, Kofron 1988). Red star: new record of *A. mexicanus* was found at Cantagallo municipality, department of Bolívar, Colombia.

tions in 5 countries. *Anomalepis mexicanus* has 2 disjunct populations, 1 distributed from the west of Honduras to the center of Panama below 500 m above sea level, and another east of the Peruvian Andes in the Amazonas department below 200 m above sea level (Fig. 1; Dunn 1941, Taylor 1951, Kofron 1988, Savage 2002, Köhler et al. 2004, Wilson and Townsend 2006, Batista et al. 2013, Sunyer 2014). This species has been found in lowland rainforests and foothill moist forests from under rotten logs and in leaf litter (McCranie and Wilson 2002). *Anomalepis mexicanus* has been assessed as Data Deficient (DD) for the IUCN Red List of Threatened Species (Batista et al. 2013) because, although its documented range is relatively broad, it is rarely found and little is known about its full geographical distribution, abundance, and ecology. Moreover, there is uncertainty about the threats it faces. Here, we report the first confirmed record of the Mexican Blind Snake, *A. mexicanus*, from Colombia.

Methods

A field survey, by means of active searching, was carried out in the Cimitarra River Valley Rural Reserve Zone (ZRC-VRC) in Cantagallo municipality, department of Bolívar, Colombia. The specimen was euthanized in 2% Roxicaine, fixed in 10% formalin solution, and preserved in 70% ethanol. We identified specimens of *A. mexicanus* by comparison to the original description of the species (Jan 1860) and the latest revision of the genus (Kofron 1988). The specimen's identification was verified by J.E. Carvajal-Cogollo. The specimen was deposited at the reptile collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia (ICN-R), under the catalogue number ICN-R 13040, and collected under the permits #524 of 17 October 2017 and #664 of 7 December 2017 of the Asociación Campesina del Valle del río Cimitarra, Antioquia-Bolívar-Santander departments, Colombia. Scale counts follow the methodology established by Kofron (1988).

Head scale photos were taken with a Leica M205 C stereo microscope with Fusion Optics type. We obtained the geographic coordinates of the capture site using a Garmin Map 62S GPS receiver and locality records for other species of *Anomalepis* (Appendix, Table A1) were obtained from Kofron (1988), Sunyer (2014), Arroyo-Sánchez et al. (2016), Serrano et al. (2016), and GBIF 2018. In cases where the coordinates of the specimen were not explicitly provided, we inferred them using the closest point to the referred locality by searching it in Google Earth™. Institutional acronyms for museum collections follow those of Sabaj-Perez (2016), except for that of the herpetological reference collection of the Universidad del Quindío (ARUQ). The map was made using the open source software QGIS v. 2.18.4 (QGIS Development Team 2017).

Figure 2. Adult female of *Anomalepis mexicanus* (ICN-R 13040) from Vereda Yanacué, Colombia, in life. Photo JG.

Results

New record. Colombia: Bolívar department: Cantagallo municipality: Vereda Yanacué: Cimitarra River Valley Rural Reserve Zone (07°17.23′ N, 074°01.78′ W, ca 205 m a.s.l.; Fig. 1), collector Juliett González, 18 October 2016, 1 individual (ICN-R 13040; Fig. 2).

The single specimen was found at noon under a fallen log during the rainy season. The forest fragment (Fig. 3A, B) had been burnt and was undergoing regeneration.

Identification. *Anomalepis mexicanus* has ventral and dorsal scales equal in size (Fig. 2), a pair of polygonal prefrontals in contact on midline behind rostral, followed by pentagonal frontal (Fig. 4A), and the eye scarcely visible under a scale (Fig. 4B). Apart from matching these characteristics, our specimen's low number of dorsal scales (265) and its scale-row formula of 24 / 22 / 20 are within the range expected for the species and distinguish it from the other 3 species of *Anomalepis* (Table 1; Dunn 1941, Taylor 1939, Marx 1953, Peters 1957, Peters and Orejas-Miranda 1970, Kofron 1988, Pérez-Santos and Moreno 1988).

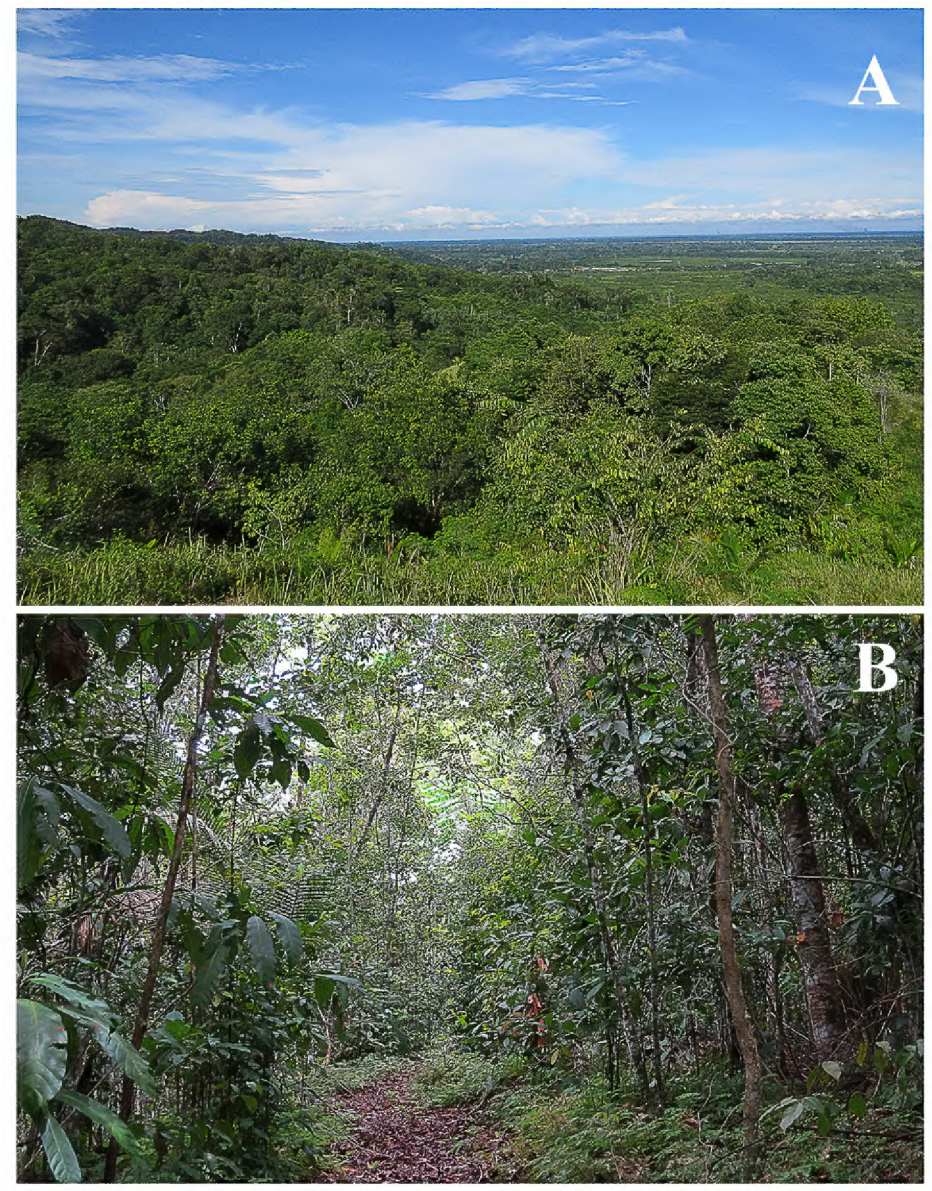

Figure 3. Forest fragment in regeneration where the first Colombian specimen *Anomalepis mexicanus* was found. **A.** Overview. **B.** Detail of the interior. Photos: JG.

Discussion

The distribution and even more the natural history of *Anomalepis* species, because of their secretive habits and small size, are poorly known (Dunn 1941, Peters 1957, Kofron 1988). The most recent review of the genus was 30 years ago (Kofron 1988) and included the different populations of *A. mexicanus* from Central America and Peru. *Anomalepis mexicanus* is an uncommon fossorial and seldom seen snake and the type species of the genus *Anomalepis*. It was first described from 1 specimen; however, the type locality ("Mexico") was in error, and the specimen is now believed lost (Kofron 1988).

Our record is the first of *A. mexicanus* for Colombia and extends its known geographic distribution by approximately 630 km in a straight line southeast from its nearest previously known locality in Panama, Corregimiento de Cristóbal, Barro Colorado Island (Kofron 1988). From the nearest previously known Peruvian locality, vicinity of La Poza, Santiago river, Amazonas

Table 1. Selected morphological characters for the genus *Anomalepis*. Information was obtained from the following literature: *A. aspinosus* data from Taylor (1939), Dunn (1941), and Kofron (1988); *A. colombia* data from Marx (1953) and Kofron (1988); *A. flaviceps* data from Peters (1957) and Kofron (1988); *A. mexicanus* data from Taylor (1939), Dunn (1941), Kofron (1988), and this study.

Species	No. of specimens examined in the papers consulted	No. of dorsal scales around the body*	No. of scale rows
A. aspinosus	3	(27 or 28) / 24 / 24	329–342
A. colombia	1	30 / 30 / 27	363
A. flaviceps	2	26 / 26 / 24	308–317
A. mexicanus, Central America	9	(24 or 26) / (20 or 22 or 23) / (20 or 21 or 22)	258–274
A. mexicanus, new record (ICN-R 13040)	1	24 / 22 / 20	265
A. mexicanus, Peru	7	(24 or 25 or 26) / (22 or 23 or 24) / (21 or 22)	265–299

department, by straight-line distance 1295 km to the northeast (Peters 1957, Peters and Orejas-Miranda 1970, Kofron 1988).

This is a rarely found species of snake that can be severely affected by deforestation and habitat loss; its populations are fragmented and distribution records are scattered. However, insufficient data prevent any Red List categorization other than Data Deficient (DD; Batista et al. 2013). We highlight the importance of our new record, which opens the possibility that the geographic range of *A. mexicanus* is still slightly larger and may even occupy future regionally protected areas in Colombia south of the Serranía de San Lucas.

However, the Cis-Andean distribution of the Peruvian specimens and the separation of these populations from Central American populations, as well as the differences in some scale counts (Table 1; Taylor 1939, Kofron 1988), suggest the possibility that there are 2 distinct species involved. The specimen we collected has scale counts between the recorded values for both populations (Table 1). Additional material for morphological comparisons and tissue samples allowing for molecular analysis will be necessary to clarify the uncertainty about this species and its populations.

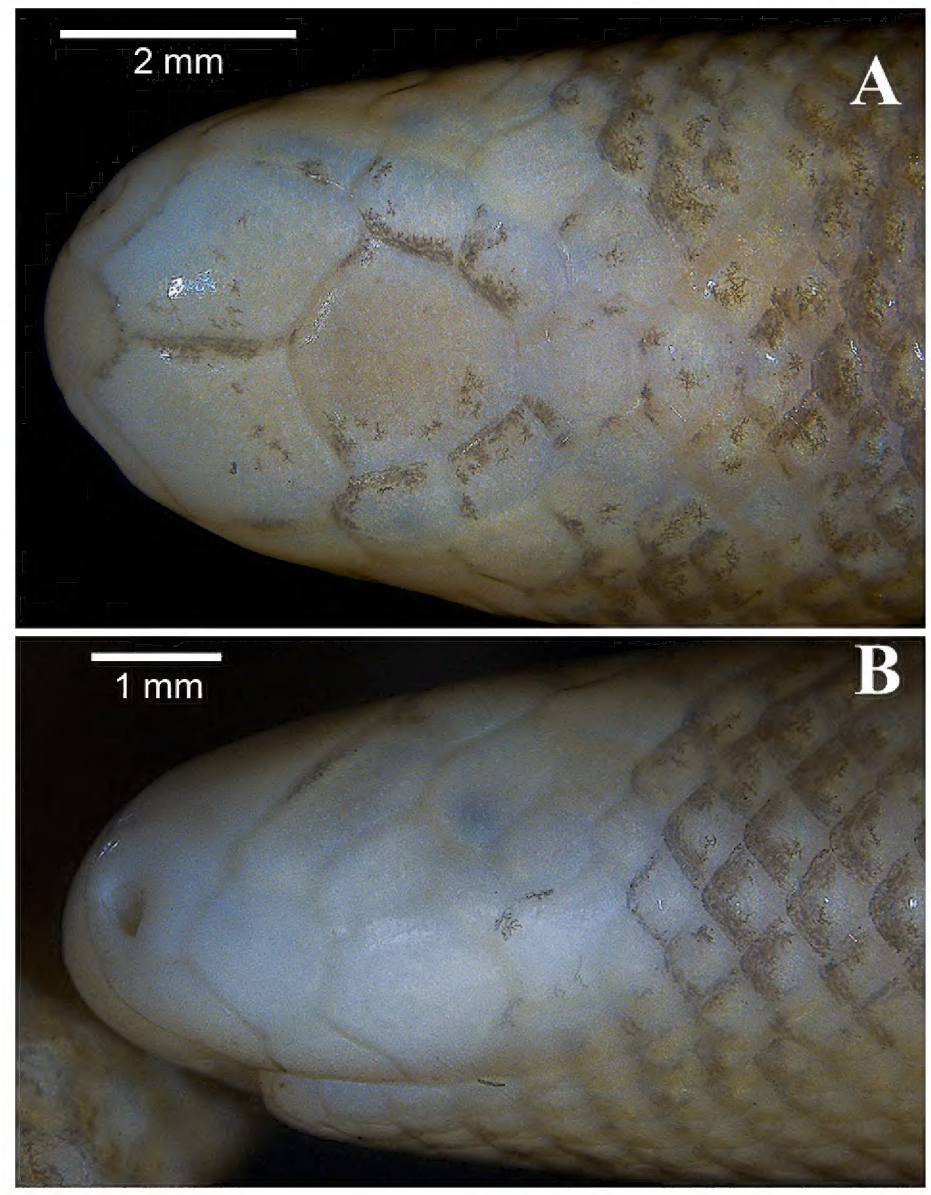

Figure 4. Close-ups of the head of the preserved specimen ICN-R 13040 of *Anomalepis mexicanus*. **A.** Dorsal head scale details. **B.** Lateral head scale details. Photos: GFM.

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Authors' Contributions

JG conducted the field survey. JG and GFM took the photographs. GFM wrote the text, made map. JG, GFM and LER made the identification, tables, and took the counts and measurements. All authors read and approved the final manuscript.

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Appendix

Table A1. Locality records for species of the genus *Anomalepis*. The geodetic datum is WGS84.

Species	Specimen voucher	Country	Province/ Department	Locality	Latitude	Longitude	Source
A. aspinosus	LSUMZ 32591	Peru	Amazonas	22 km SE Bagua Grande	05°53.83'S	78°18.07'W	Kofron (1988)
A. aspinosus	MCZ 14781–85, 17401–03, USNM 76295	Peru	Cajamarca	Perico	05°20.63'S	78°47.68'W	GBIF (2018), Kofron (1988)
A. aspinosus	CM 90254, LSUMZ 19450–54	Peru	Cajamarca	Perico, 28 km N of Santa Cruz	06°21.32'S	78°55.61'W	GBIF (2018), Kofron (1988)
A. colombia	In process of being deposited at the ICN-R collection	Colombia	Antioquia	Toledo municipality, corregimiento El Valle, Tacuí Cuní	07°02.90'N	75°41.90'W	Arroyo-Sánchez et al. (2016), Serrano et al. (2016)
A. colombia	FMNH 54986	Colombia	Caldas	Pueblo Rico municipality, La Selva	05°07.88'N	75°31.59'W	Kofron (1988)
A. colombia	ARUQ-106	Colombia	Quindío	Armenia municipality, Universidad de Quindío campus, Botanical Garden	04°33.18'N	75°39.79'W	GBIF (2018)
A. flavapices	USNM 196349	Ecuador	Esmeraldas	near Esmeraldas	00°58.99'N	79°42.00'W	Kofron (1988)
A. flavapices	AMNH R-6966	Ecuador	Manabí	No data	00°56.06'S	80°22.64'W	Kofron (1988)
A. mexicanus	ZFMK 57773	Costa Rica	Guanacaste	Guanacaste National Park, Quebrada Zompota, south of Estación Biológica Maritza	10°57.41'N	85°29.69'W	GBIF (2018)
A. mexicanus	KU 35512	Costa Rica	Guanacaste	4 km ESE Los Ángeles de Tilarán	10°28.47'N	85°02.99'W	Kofron (1988)
A. mexicanus	UMMZ 132190	Costa Rica	Guanacaste	Highway 19, 5,5 km W Tilarán	10°26.23'N	84°56.88'W	Kofron (1988)
A. mexicanus	USNM 565512	Honduras	Gracias a Dios	Cañones Cay	15°49.20'N	84°39.00'W	GBIF (2018)
A. mexicanus	USNM 563482–83	Honduras	Gracias a Dios	San Hil	14°56.56'N	84°40.45'W	GBIF (2018)
A. mexicanus	USNM 562870, 564062–63	Honduras	Gracias a Dios	Warunga Tingni Kiamp	14°56.56'N	84°40.46'W	GBIF (2018)

Table A1. *Continued.*

Species	Specimen voucher	Country	Province/ Department	Locality	Latitude	Longitude	Source
A. mexicanus	UF 141964–65	Honduras	Gracias a Dios	Urus Tingni Kiamp	14°55.00'N	84°40.99'W	GBIF (2018)
A. mexicanus	SMF 82845	Nicaragua	Atlántico Norte	Parque Nacional Saslaya	13°55.39'N	84°51.82'W	Sunyer (2014)
A. mexicanus	AMNH R-119069	Panama	Bocas del Toro	No data	09°22.65'N	82°31.43'W	GBIF (2018)
A. mexicanus	MCZ 191201	Panama	Panamá	Canal Zone, Gatún	09°12.41'N	79°52.04'W	GBIF (2018)
A. mexicanus	FMNH 8224, 22853, 94731, MCZ 29220, KU 75663, 116883	Panama	Panamá	Corregimiento de Cristóbal, Canal Zone, Barro Colorado Island	09°09.29'N	79°50.73'W	Kofron (1988)
A. mexicanus	AMNH R-103750	Panama	Panamá	No data	08°59.96'N	79°33.23'W	GBIF (2018)
A. mexicanus	MVZ 174999	Peru	Amazonas	vicinity of La Poza, Santiago river	04°01.32'S	77°45.06'W	Kofron (1988)
A. mexicanus	MVZ 163245	Peru	Amazonas	vicinity of Huampami (Aguaruna village), Cenepa river	04°27.34'S	78°09.67'W	Kofron (1988)
A. mexicanus, new record	ICN-R 13040	Colombia	Bolívar	Cantagallo municipality, Vereda Yanacué	07°17.23'N	73°59.74'W	This study